

NAVAL DEVELOPMENT.

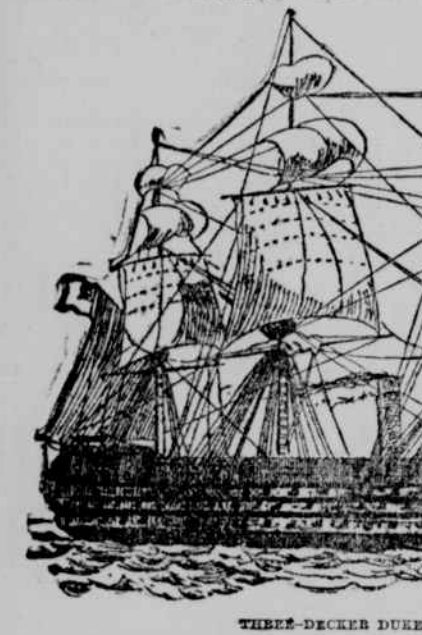
CHANGES IN MARINE ARCHITECTURE IN FOUR CENTURIES.

Why the Great Eastern Failed—Steamers of Greater Length and Much Greater Speed for the Atlantic.

Old chroniclers tell us that four hundred years ago the people "who went down to the sea in ships" did a good deal of going down in it. The gain in safety, speed and comfort during these four centuries, both for mariners and passengers, has been enormous. Aside from the improvements in ships themselves the accessories of navigation have been vastly bettered. Even on the coasts of Europe Columbus and his contemporaries had no charts to guide them—that is, as we understand the term now. The "wheel charts" of that day simply gave rough approximations of the coast line and of the courses between prominent points, and these latter were only to be derived, not directly given. Shores were not laid down in the area, nor in exact position. The useful legend was "hereabouts a dangerous reef," or something similar. The sextant, chronometer and nautical tables (except of the rudest sort) had yet to be devised. The mariner's compass was still a very crude affair and very imperfectly understood.

Turning to the vessel herself, we find that she was small, in average dimensions not exceeding those of the smaller class of New England fishing schooners, though of very different model, both above and below water. The bottom was not coppered, rapidly fouled with weeds and other marine growth, and this growth was rarely removed from lack of facilities for doing so. The set of the sails, on the larger craft especially, was rarely such as to admit of beating to windward. This defect alone often rendered a voyage of a hundred miles or so an affair of weeks.

Seagoing commerce had not yet reached very great proportions, and it is therefore not remarkable that, in the fifteenth and sixteenth centuries, men-of-war led merchant craft in point of size. The general character of the line-of-battle ship developed in the sixteenth century remained practically unchanged until the advent of steam, and even overran that point by fifty years, as may be seen by inspection of the picture given here of the Duke of



THREE-DECKED DUKE OF WELLINGTON.

Wellington, the crack ship of the British navy in 1833. The chief changes observable in the seventeenth and eighteenth centuries were the gradual reduction in height of poop and forecastle, increased length, and the adoption of the screw propeller in place of the paddle wheel.

Whether a sense of the beautiful had anything to do with the alteration is unknown—probably not much. In the eighteenth century ships had changed no less completely than the fashion in dress. We no longer look upon the hideous hoop distended skirts of thirty years ago with approval, preferring instead dresses which more nearly conform to and set off the natural form. No less decided is the change from the short, clumsy-looking craft of other days, with its bluff bows, high topsides and cocked up bowsprit, to the long, narrow, swift ocean greyhound of the present.

Hans Buek, writing in 1858 what is considered a standard history of contemporary naval affairs, adopted as the frontispiece of his work an engraving of the Duke of Wellington, 123 guns, one of the six three-deckers of the British navy. She was regarded as the pride of the service and as representing the essence of nautical beauty.

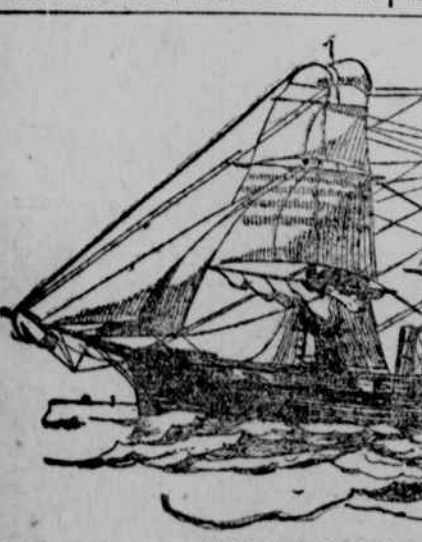
In another part of his work Buek gives a cut of the United States steamer Niagara, then just completed and placed in commission. He comments upon her design as follows:

"The engraving of the celebrated Niagara will serve to convey a very correct idea of the external appearance of this class of frigates. She has no beauty to recommend her. . . . Her stern is very great. Altogether, in appearance, there is nothing about her to please the eye."

It may be noted here that the picture of the Niagara, given by Buek, is not a correct likeness of Steer's beautiful frigate, and his description was also faulty, but it is interesting to observe what was the standard of beauty in English nautical eyes of that time.

The ocean steamer of to-day, whether mercantile or naval, has advanced another step in evolution. It has dispensed with sails altogether and the masts are reduced to signal poles or supports for elevated fighting towers.

While this change in external appearance has been taking place the alterations of the interior have been wholly revolutionary. First, a place had to be



UNITED STATES STEAM FRIGATE NIAGARA.

found for engines and boilers. Still for a time the hulls were of wood and the increased strains of the machinery decreased the length of life of the structure. Seams that would have stood many another winter gave under canvas opened up the continuous pounding of the machinery. It has been said that half the Atlantic has passed through the bottoms of our wooden craft to find its way overboard again through the pumps. It is very sure that the wooden steamers contributed their full share to the standing line. This inability of wood to stand the strain of the more powerful machinery led naturally to the employment of

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found for engines and boilers. Still for a time the hulls were of wood and the increased strains of the machinery decreased the length of life of the structure. Seams that would have stood many another winter gave under canvas opened up the continuous pounding of the machinery. It has been said that half the Atlantic has passed through the bottoms of our wooden craft to find its way overboard again through the pumps. It is very sure that the wooden steamers contributed their full share to the standing line. This inability of wood to stand the strain of the more powerful machinery led naturally to the employment of

iron.

The new material was found to fill the

not a product of healthy development, but an exotic-hot-house plant, unsuited to her surroundings. Neither trade nor travel demanded such proportions.

Vessels were growing even faster in engine power. It was one of our misfortunes in the United States that this thing clung to wood as a ship-building material. But our iron industries were not fully developed until after the close of the war, and wood was plentiful and cheap.

The result in the construction of wooden hulls for the Wampanoag class of cruisers. These vessels were designed during the last years of the war and were intended to prevent the possibility of a

new Alabama repeating her performance, and more effectually to close the ports of the Southern States with a blockade by cruisers from which no blockade runner could escape. The Wampanoag was designed in 1863. The hull was built at the Navy Yard, New York. The engines designed by Mr. Isherwood, then engineer in chief of the navy, were built at the Navy Yard, New York. Her speed for thirty-seven hours averaged almost seventeen knots, and but for the weakness of the hull this speed could have been maintained as long as the coal lasted. The Wampanoag was, like the Great Eastern, a forced product and years ahead of her time. But what a splendid success she was from an engineering point of view! In days when ten or eleven knots was the average maximum speed of men-of-war, and the fastest sailing vessels afloat, naval or mercantile, could not exceed thirteen, here was a ship whose average maximum sustained sea speed almost reached seven-

teen. It was as if to-day, by the employment of enormous engine power, a war vessel should be produced whose speed would exceed that of the City of Paris by 40 per cent, equal to twenty-eight knots. It is needless to go into the various causes which led to the total rejection of the Wampanoag class as cruisers. Her real defects were largely remediable, had it been thought desirable to aim so high again. For nearly twenty years her record was unexcelled. To-day only a few merchant steamers and probably not a dozen men-of-war can equal her performance.

After the lapse of fifteen years, during which the maximum sea speed remained about thirteen knots, the Guion line in 1879 put out the Alaska, whose average passage was almost a day less than that of any of her predecessors. From that time to the present the speed of transatlantic ships has been steadily and rapidly increasing. The City of Paris had reduced the Atlantic time by a day and a half, and ships are now in process of construction which will, beyond question, reduce it still more—possibly by half a day. Where the competition will cease it is not safe to prophesy. Conditions change, threatening obstacles disappear or are surmounted and the progress is continuous.

A few years ago the triple expansion engine was a novelty. Now it is ordinary construction. The same may be said of twin screws. The advantage of the latter could not be more clearly shown than by the recent